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Title: Water depth effects on impact loading, kinematic and physiological variables during water treadmill running

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Water depth effects on impact loading, kinematic and physiological variables during water treadmill running.

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Highlights

- Running gait was significantly altered with changes in water immersion depth
- Above waistline depths decreases variables associated with ground impact while reducing physiological demand
- Below waistline depths increases variables associated with force development at toe-off while increasing physiological demand

Abstract

Purpose: The purpose of this study was to compare impact loading, kinematic and physiological responses to three different immersion depths (mid-shin, mid-thigh, and xiphoid process) while running at the same speed on a water based treadmill.

Methods: Participants (N=8) ran on a water treadmill at three depths for 3 minutes. Tri-axial accelerometers were used to identify running dynamics plus measures associated with impact loading rates, while heart rate data were logged to indicate physiological demand.

Results: Participants had greater peak impact accelerations ($p<0.01$), greater impact loading rates ($p<0.0001$), greater stride frequency ($p<0.05$), shorter stride length ($p<0.01$), and greater rate of acceleration development at toe-off ($p<0.0001$) for the mid-shin and mid-thigh compared to running immersed to the xiphoid process. Physiological effort determined by heart rate was also significantly less ($p<0.0001$) when running immersed to the xiphoid process.

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